

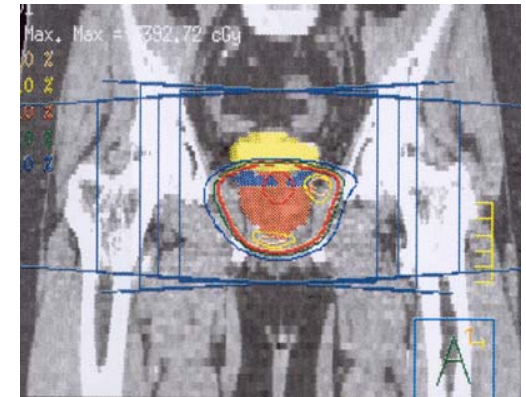
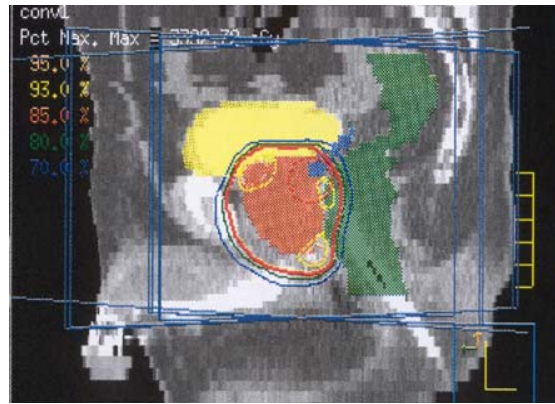
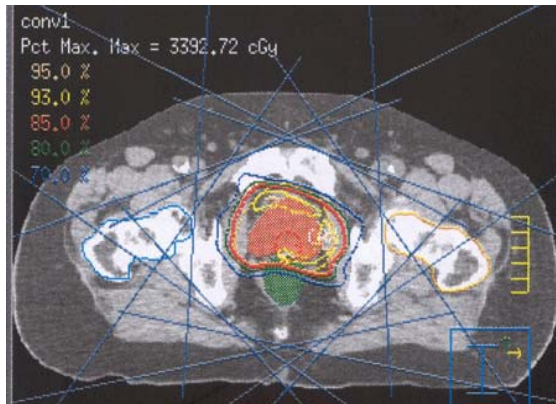
INTRODUCTION

The following documents an IMRT QA procedure using Thomson Nielsen's MOSFET technology for absolute dose measurement. A commercially available desktop scanner and an off the shelf graphics package are used to provide relative dose and intensity maps from Kodak EDR-2 film. This time and cost effective hybrid procedure presents a viable QA solution other than pure film dosimetry.

This QA procedure is called the Wu Procedure, in regard to the collaborative efforts of Dr. Xiaodong Wu from the University of Miami. Dr. Wu also was instrumental in the design of our IMRT phantom, also known as the XWU-IMRT phantom.

The procedure is simple. Once a treatment plan has been applied to the film and MOSFETs in the phantom, the film is digitized and compared to the absolute readings given by the MOSFETs. If the MOSFET results are in close agreement with predicted dose from the treatment planning system, QA is considered successfully complete.

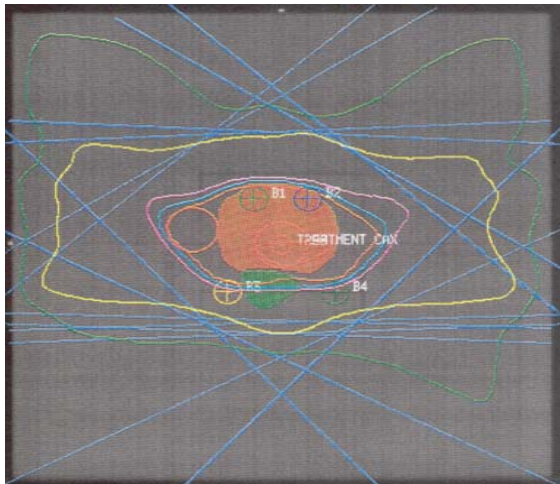
IMRT PLAN



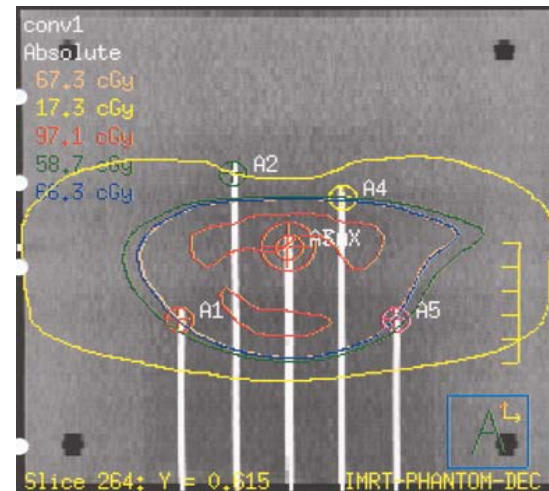
An IMRT plan is designed and developed using one of many commercial inverse planning tools. In the above example, CORVUS from NOMOS is used for a prostate case.

To QA this treatment plan, take a CT scan of Thomson Nielsen's XWU-IMRT Phantom with the MOSFET dosimeters installed. Apply any necessary density correction factors, and transfer this to the RTP software and generate the treatment plan for QA.

APPLYING IMRT PLAN TO THE PHANTOM



CAX-transverse plan (5 MOSFETs)



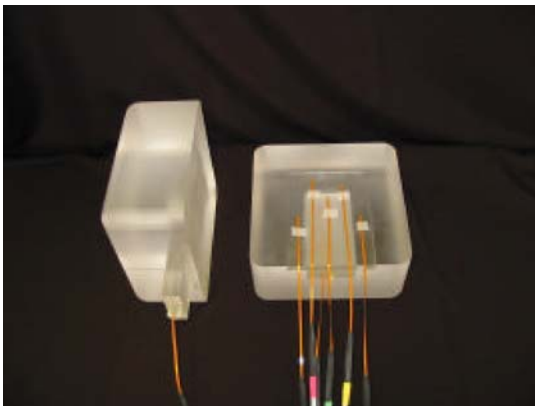
CAX-coronal plan (5 MOSFETs)

Apply the plan to the Phantom and note that the MOSFETS that are coplanar with the film on the coronal plan can be seen on the RTP output.

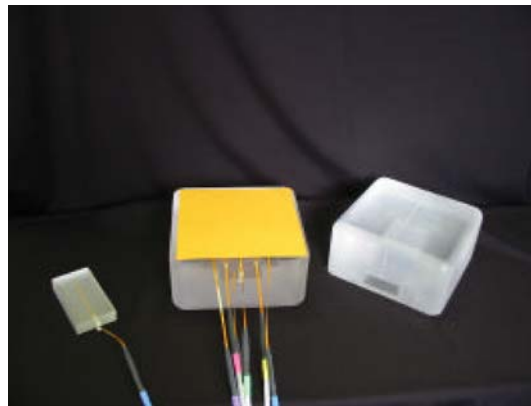
Compute the point doses of all MOSFET dosimeter locations (represented as small volumes in the treatment plan) and make an isodose plot of the dividing plane. The plot includes isodose lines that are correlated to the dose levels of the five dosimeters.

PREPARING THE PHANTOM FOR IRRADIATION

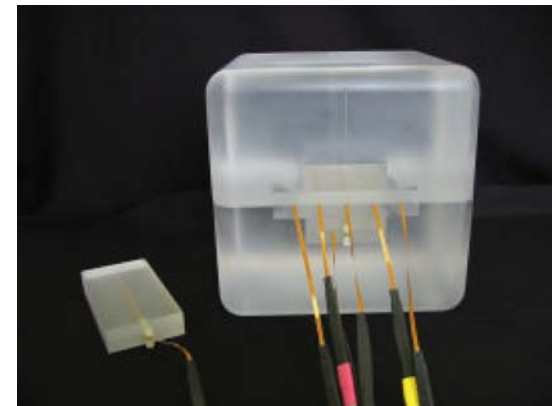
1. Check the placement of the MOSFETs



2. Place the film



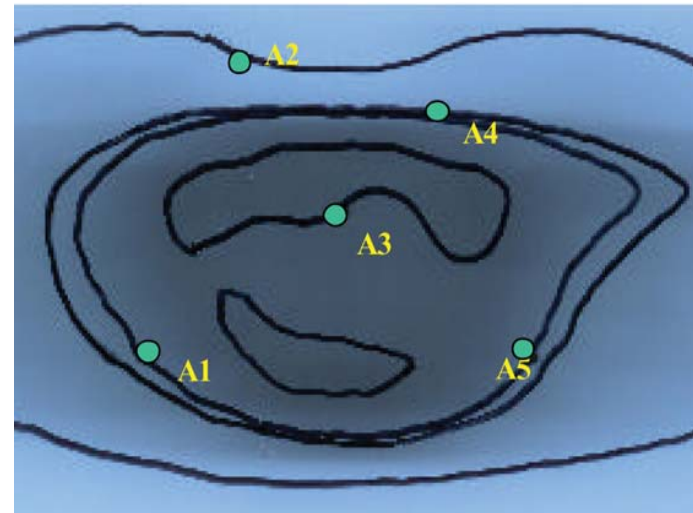
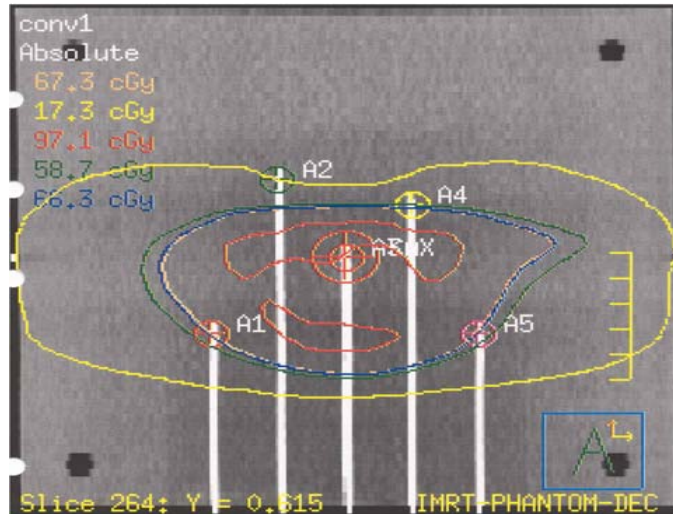
3. Assemble & irradiate



It is recommended to place pin holes in the film at the MOSFET locations using a prepared template for a physical indication of the placement of the MOSFETs on the film.

Recommended film is Ready-Pack Kodak EDR-2

OVERLAYING RTP PLAN ONTO FILM

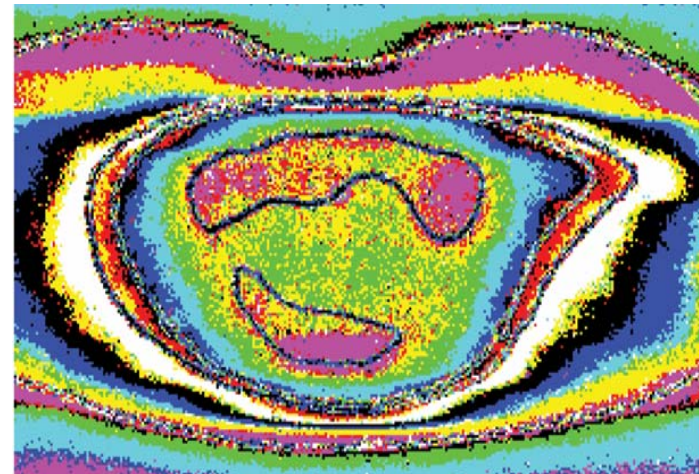
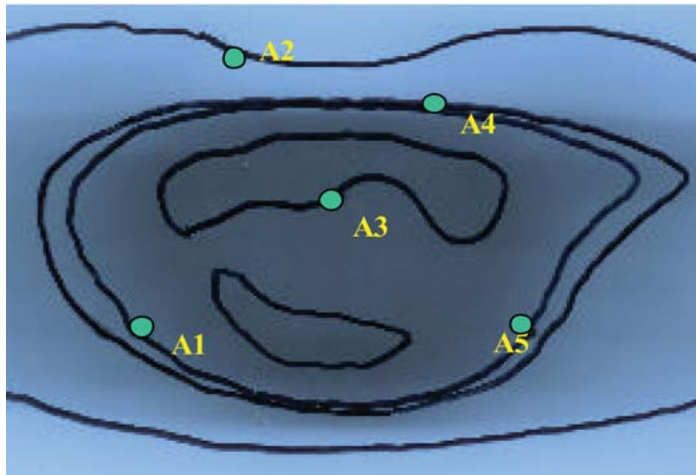


CAX-coronal plan (5 MOSFETs)

Overlay the exposed film on the RTP output and trace the isodose lines which correlate to the five MOSFET dosimeters.

SUPERIMPOSED FILM/RTP ISODOSE PLOT

An intensity map is developed using Corel Photo Paint or an equivalent off the shelf graphics package. After the film has been scanned using a desktop scanner, initial QA is performed visually to ensure that the RTP isodose lines match the general dose levels shown by the film. The final step is the addition of the MOSFET locations to the intensity map, which is shown in the following slide.

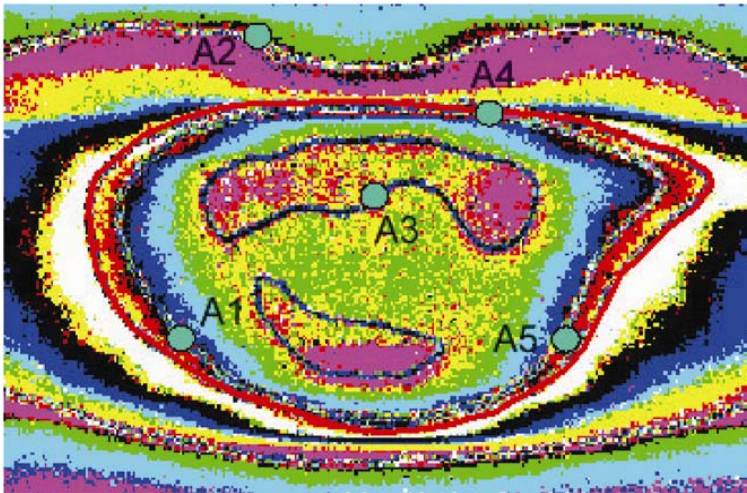


Exposed and digitized film results

DATA ASSESSMENT

Dosimeters→	A1	A2	A3*	A4	A5	B1	B2	B3	B4
RTP-dose	81.7	82.0	99.4	96.8	82.0	102.6	101.9	91.5	90.2
MOSFET	81	82	97	99	82	102	102	94	93
%DIV	-0.9%	0.0%	-2.4%	-2.3%	0.0%	-0.6%	0.0%	2.7%	3.1%

*A3: Center of the phantom



Point doses : RTP vs MOSFET (cGy)

To conclude the procedure, output the RTP dose points and correlate these values with the dose measured by the MOSFETs.

If RTP-dose and MOSFET results are within a user specified range that is deemed acceptable, the QA procedure is successfully complete.